

REMARKS

This Amendment, submitted in response to the Office Action dated August 1, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-19 remain pending in the application have been rejected under 35 U.S.C. Section 112, second paragraph, as being indefinite and under 35 U.S.C. 102 as being anticipated by Kitaoka (U.S.P.6,327,289). Applicant amends the claims as set forth above to obviate the Section 112 rejections. Applicant would submit that the modifications do not narrow the scope of the claims or raise new issues. Applicant submits the following arguments in traversal of the Section 112 and prior art rejections.

With further regard to the Section 112 rejections, the Examiner indicates that the claims do not recite a domain inversion portion or a wavelength of a fundamental wave. However, these terms are well known to one skilled in the art, and to the extent the Examiner is requiring Applicant to define a preferred embodiment of the invention, such is not a requirement for satisfying Section 112. The Examiner further objects to the language of a non-linear optical effect and how it is formed. The rejection is obviated by the proposed claim amendment. The Examiner also objects to the recitation of a plane. However, the concept of a plane is also known. The plane is further described as perpendicular to a propagation direction of a wave. Therefore, the amended claims are sufficiently definite.

If there is a special effect achieved by the "non-linear optical effect" of the invention, please describe the effect and how it is formed more specifically, and the subject matter will be added as a new dependent claim.

Turning to the prior art rejections, Applicant's invention relates to a semiconductor laser and a method of fabrication. Detailed descriptions of the background and exemplary embodiment of the invention are set forth in the Amendment of April 15, 2003 at pages 3-4. Applicant would refer the Examiner to these descriptions.

Turning to the newly cited art, Kitaoka relates generally to a variable wavelength semiconductor laser. Referring to Figs. 4A and 4B, an optical wavelength converting device 11 includes a proton exchange optical waveguide 126 and periodic domain-inverted regions 127 provided in an x-cut MgO-doped LiNbO₃ substrate 125. Col. 9, lines 29-39. The laser source 1 is described as having a small spread angle in the direction parallel to the surface of a mounting substrate (x-direction) and large in the direction perpendicular to the surface of the substrate (y-direction). Col. 3, lines 36-44. Thus the positioning accuracy of the laser in the y direction must be closely controlled. The Kitaoka invention is directed towards accurate positioning of the laser relative to the optical waveguide.

The Examiner maintains that Kitaoka teaches each feature of independent claim 1. Based on our understanding of the references, Applicant would submit that the rejection is not supported for at least the following reasons.

Claim 1 describes polarization of the TE mode waveguide is in a direction parallel to the direction of the ferroelectric substrate. The Examiner has not indicated where such polarization is taught in Kitaoka, but merely states that such polarization is present. There is no reason why the polarization of the TE waveguide corresponds to that claimed. Absent the Examiner's rationale on the polarization direction, the rejection is improper. Similarly, the analogous

recitation for the semiconductor laser is also not inherent in Kitaoka. To the extent the reference discusses beam spread, this need not refer to polarization effects of the laser. Therefore, the teachings of the polarization recitations cannot be confirmed except by resort to improper speculation. Therefore, claim 1 is patentable for at least these reasons. Claim 12, including similar recitations, is patentable for the same reasons.

Additionally, in Kitaoka, the TE mode, wavelength conversion element and laser are parallel to the substrate. On the other hand, in the invention as claimed, spontaneous polarization direction of the substrate forms a predetermined angle with respect to the substrate surface in a plane perpendicular to a propagation direction of the fundamental wave.

With further regard to claims 3-5, these claims describe an angle orientation for the spontaneous polarization. According to our understanding of the invention disclosure and the reference, the spontaneous polarization of MgO-LiNbO₃ is the z-axis direction. Kitaoka specifically describes that its substrate is x-cut, and thus the direction of spontaneous polarization (the z-axis) would be perpendicular to the x-cut orientation. Furthermore, Fig. 10, for example, shows a direction of propagation in a z-axis direction. Therefore, the angle of the spontaneous polarization relative to the substrate surface in the direction of propagation (z-axis as shown in Fig. 10 of Kitaoka) would be 0 degrees (coincident with each other). By contrast, claims 3-5 each describe that the angle is larger than zero. Therefore, claims 3-5 are patentable for these additional reasons. The Examiner's reliance on col. 3 to teach these aspects of the invention does not support the rejection. The column merely mentions a spread of a light source but does not discuss spontaneous polarization relative to a propagation direction of a fundamental wave. Please confirm that these comments are appropriate.

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With regard to claims 9-10, these claims describe a silicon bond between the laser and the optical waveguide. The Examiner relies on a silicon film layer 16 to teach this aspect of the invention. However, the cited silicon layer is not disposed between the laser and the optical waveguide. Therefore, claims 9-10 are patentable for this additional reason.

With further regard to claims 16-18, these claims refer to a depth and length of a domain inversion region. The Examiner relies on col. 3 to teach this aspect of the claims. However, col. 3 only describes a spreading condition of the laser, but not characteristics of the domain inversion. Claims 16-18 are patentable for these additional reasons.

Claims 20-21 are added to describe the invention more particularly.

In view of the above, Applicant submits that claims 1-21 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

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Respectfully submitted,

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